Operating Instructions
The Meade LX70 Polar Scope

For use with all LX70 Series Mounts

For most telescope observers casual polar alignment is all that is needed, which will not require use of the polar finder. However, for those observers who need to meet the more demanding requirements of astrophotography, the polar scope allows the telescope mount to be more precisely aligned with the celestial poles. The polar scope contains a reticle pattern which is used in assisting the user in achieving a more accurate polar alignment.

Installing the Polar Scope:

1. Begin by removing the polar axis front and rear covers (see figure 1).

2. Remove the rear part of polar axis (see figure 2) by rotating it counter-clockwise. This part will not be used.

3. Thread in the Meade LX70 polar scope until firmly seated. The polar scope is now installed and should remain installed in the mount. When finished using the polar scope, replace the front and rear covers.

Before the polar scope can be properly used with any precision, it must first be calibrated to the mount's polar axis.

Aligning the Polar Scope to the Polar Axis:

1. Set the telescope mount & tripod up outside in the daytime with the optical tube, counterweight and counterweight shaft removed.

2. Unlock the DEC axis and rotate it to DEC 0. In this position, the optical tube (if installed) would be at 90 degrees to the mount. With the DEC axis in this position and polar scope covers removed, you can now view thru the polar scope at a distant terrestrial target.

3. Look through the polar viewfinder and notice the reticle pattern (see figure 6). Note, some reticle patterns may appear different but the alignment procedure is identical. If the reticle is not in focus, rotate the focus ring (fig 5, #11) until the reticle pattern is sharp.

4. Adjust the mount and tripod so the polar axis is pointing at a distant terrestrial object. The further the target, the more accurate the alignment.

5. Placing the reticle center cross hair over the target, unlock the RA and rotate the RA axis 180 degrees, from one side of the mount to the other (see figure 3A & 3B). Re-lock the RA axis.

If the polar scope is not aligned with the mount's polar axis, the target will move off center (see figure 4A & 4B) and the reticle adjustment screws (see fig 5, #9) will need to be adjusted.

6. To adjust the polar scope so the target does not move off the reticle cross hair, slightly loosen the reticle adjustment screw which is closest to the cross hair and opposite of the movement. You then need to tighten the adjustment screw on the side closest to the target. Notice that a small turn of each screw will result in a large movement of the reticle. Only adjust the screws to correct for half the movement off the cross hair at a time, moving the target approximately halfway to the center of the reticle.

NOTE: The reticle adjustment screws work in a push-pull motion. When loosening these screws, never loosen more than 1/8 of a turn at a time. Doing so could cause the reticle to fall out. When one adjustment screw is loosened, an adjustment screw on the opposite side should be tightened. Do not over tighten or you may damage the reticle.

7. Next, unlock the RA axis and rotate this axis 180 degrees, back to the starting point. Re-lock the RA axis. Repeat steps 4-7 until the target no longer moves off the reticle cross hair.

8. The polar scope is now properly aligned with the mounts polar axis.

Calibrating the Dials and Indicators:

There are several additional parts on the mount and polar scope that need to be calibrated; the RA setting circle(fig 5, #3), Calendar-dial scale(fig 5,

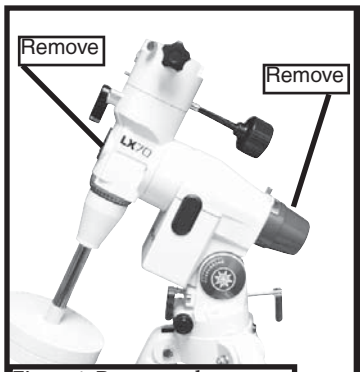

Figure 1: Remove polar covers

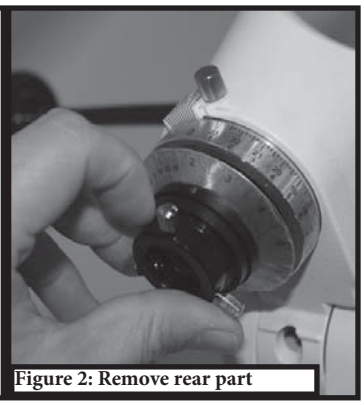
Figure 2: Remove rear part

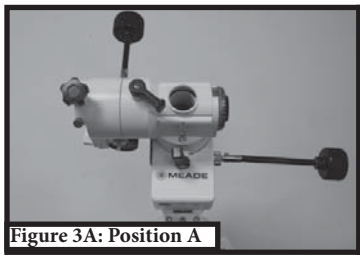

Figure 3A: Position A

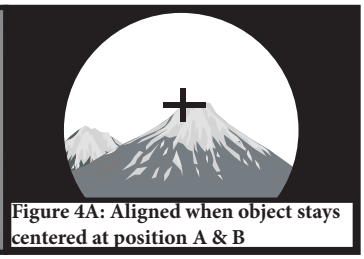
Figure 4A: Aligned when object stays centered at position A & B

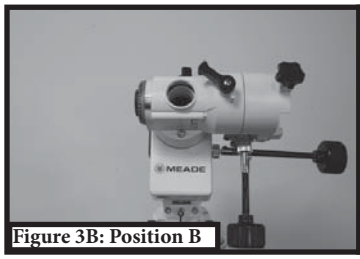

Figure 3B: Position B

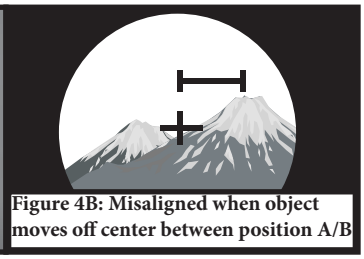
Figure 4B: Misaligned when object moves off center between position A/B

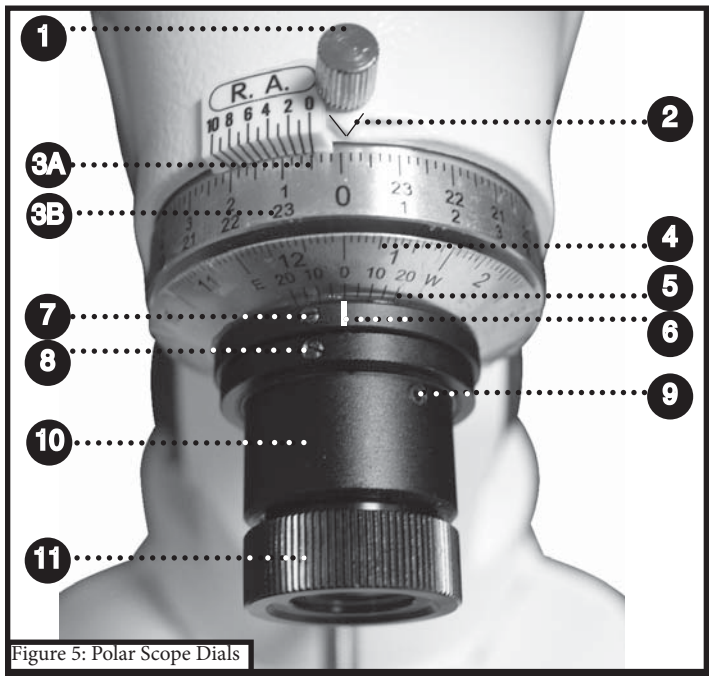

Figure 5: Polar Scope Dials

1. RA setting circle locking screw
2. RA setting circle indicator
3A. RA setting circle - (Northern hemisphere users)
3B. RA setting circle - (Southern hemisphere users)
4. Calendar-dial scale
5. Longitude offset scale
6. Longitude-offset scale indicator
7. Longitude indicator locking set-screw
8. Assembly set screw (not used)
9. Reticle adjustment screws (3)
10. Polar scope
11. Focusing ring

#4), and Longitude-offset indicator (fig 5, #6). All are located adjacent to the polar scope. For the part locations of these dials, see figure 5. To calibrate the dials and indicators:

1. Unlock the RA setting circle locking screw(fig 5, #1) and position the RA setting circle dial (fig 5, #3) until the 0 mark is aligned with the RA setting circle indicator (fig 5, #2). Re-tighten the locking screw.

2. Look through the polar scope and note the reticle cross-hair. Unlock the RA axis and rotate the RA until "Polaris" is at the bottom of the polar scope field of view as shown in figure 6. Re-lock the RA axis.

3. Now adjust the calendar dial (fig 5, #4) so the large line between the 10 & 11 is aligned with the mount RA indicator (see fig 7).

Note: The calendar dial is numbered 1-12 with the longest lines separating the months. The short lines are two days apart and medium sized lines are ten days apart.

4. With the RA in this position, the Longitude-offset scale indicator (fig 5, #6) needs to be aligned with the 0 mark on the Calendar-dial (fig 5, #4). If it is not aligned with the calendar dial 0 mark, use a tiny flat head screwdriver(user supplied) to loosen the Longitude indicator locking setscrew and align the marks. Tighten the screw when aligned. When complete the reference dials should appear as in figure 7.

The dials and reticle pattern are now adjusted for a specific calendar date and time where Polaris is directly above the North Celestial Pole(NCP) crossing the meridian. This occurs at midnight on November 1st. The "Polaris" mark in the reticle was placed at the bottom of the viewfinder field of view since the polar scope image is inverted.

Adjust for Site Longitude:

Depending on your observing site longitude, you may need to further adjust the Calendar-dial scale(see fig 5, #4) to compensate for your site longitude. First determine your observing site longitude by looking at a map, GPS, or the internet. You will also need to determine the reference time zone meridian for your time zone. For observers in the USA, see Figure 9. This can also be found using the internet. Once both values are known, subtract your site longitude from the reference time zone meridian to determine the longitudinal-offset needed.

Reference Time Zone Meridian - Observing Site Longitude = Longitudinal-Offset

If the longitudinal-offset is a positive value, you're East of the reference meridian. If the longitudinal-offset is a negative value, you're West of the reference meridian.

For example: The longitude in Irvine, California is 117.82° West. The reference time zone meridian for the Pacific Time zone is 120°.

120° - 117.82° = 2.18° East

To compensate for this longitudinal-offset, the Calendar-dial scale(fig 5, #4) will be adjusted. Note each line on the longitude-offset scale is 5° apart. Therefore, the longitudinal-offset scale should be adjusted to 2.2° East, between the 0 mark and first line left of the 0 mark (see figure 8). Do not change this longitudinal-offset unless your observing sites differ significantly in longitude.

Using the Polar Scope:

Now that the polar scope is aligned to the polar axis and dial indicators properly calibrated, the polar scope is ready for use in obtaining a precise polar alignment.

1. At night, fully assemble your LX70 and point it to True North.

2. Remove both polar scope front and rear covers. See figure 1.

3. Rotate DEC to 0 (perpendicular to the mount) so you can view through the polar axis.

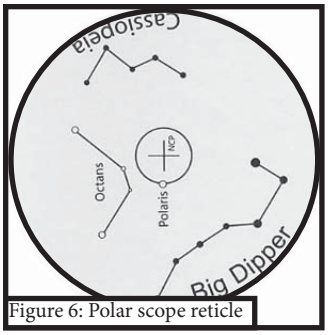

Figure 6: Polar scope reticle

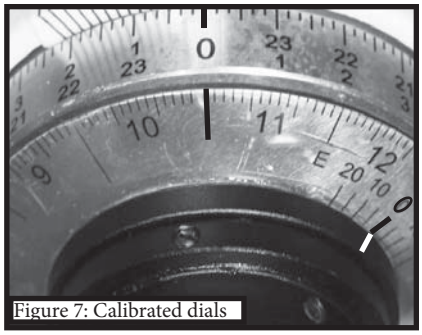
Figure 7: Calibrated dials

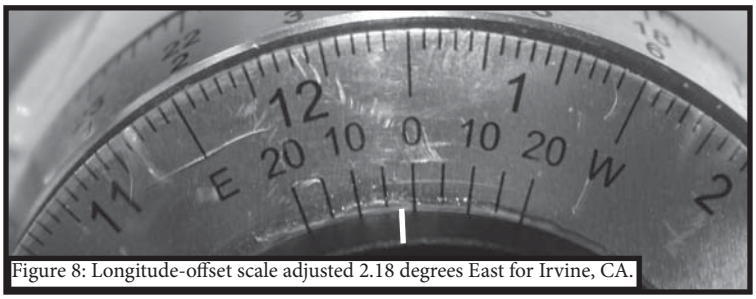
Figure 8: Longitude-offset scale adjusted 2.18 degrees East for Irvine, CA.

Time Zone	Reference Time Zone Meridian
Hawaiian	150° West
Alaskan	135° West
Pacific	120° West
Mountain	105° West
Central	90° West
Eastern	75° West
Alantic	60° West

Figure 9: Reference time zone meridians for the USA

4. Unlock the RA axis and rotate it so the current time on the RA setting circle (fig 5, #3) is aligned with the current date on the calendar dial(fig 5, #4). Note all times are in standard time and daylight saving times should not be used. Lock the RA. *Remember the top row of numbers on the RA setting circle are for Northern Hemisphere users. The bottom row of numbers on the RA setting circle are for Southern Hemisphere users.*

5. For Northern Hemisphere: Move the telescope mount using the azimuth and latitude controls until Polaris (the North Star) is placed within the "Polaris" reference circle on the reticle. If done correctly, the reference stars in the Big Dipper and Cassiopeia should be in the same orientation as the markings in the polar scope. The center cross hair denotes the location for the North Celestial Pole (NCP). It may be helpful to shine a red light over the front of the mount to illuminate the reticle.

6. For Southern Hemisphere: Move the telescope mount using the azimuth and latitude controls until the four-sided figure labeled "Octans" in the reticle are superimposed on the four star group in the southern night sky. The grouping of four stars in Octans (Sigma, Tau, Chi, and Upsilon) are the closest reference objects near the South Celestial Pole (SCP) and are often used in obtaining a precise polar alignment. It may be helpful to shine a red light over the front of the mount to illuminate the reticle.

Note: Not all pointing positions are possible with the polar alignment reticle, as the tripod is a limiting factor as to how far the optical tube and mount can be moved.

7. Once the celestial pole is centered, tighten the latitude and azimuth adjustment knobs. The mount is now precisely aligned on the night sky. Remember to replace the polar scope covers to protect the polar scope.

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